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2003 LIVESTOCK FEED ASSISTANCE PROGRAM AND FEEDING NON-FAT DRIED MILK

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ABSTRACT: On April 8, 2003, the USDA offered surplus stocks of non-fat dried milk (NDM) to beef producers in drought stricken areas as a form of drought assistance. By June 13, 2003, based on drought index information, 134 counties across 10 western states were eligible for over 104 million kg of NDM. Increased drought severity following the initial announcement increased the eligible area to include 12 western states. The NDM allocations for each county and state were determined by estimating the total number of livestock (beef cattle, bison, sheep and goats), offering a 30-d supply of NDM based on providing .91 kg/d for cattle and bison and 0.23 kg/d for sheep and goats. Producers enrolled in the program were given the option of having their allocation delivered to the feed company of their choice and receiving approximately $.09/kg NDM credit ($80/ton) applied towards the purchase of a NDM-containing feed, or taking actual delivery of the NDM to their ranch. Based on laboratory analysis and limited studies, NDM is an excellent source of supplemental protein, well-suited for grazing or confined feeding situations, provided the proper feed handling equipment. Crude protein levels range from 35 – 37%, with average energy values of 1.76 Mcal/kg NEm and 1.15 Mcal/kg NEg. Non-fat dried milk can be used as a protein and energy source when included in rations and range supplements. However, the physical characteristics of the product make it challenging to feed. Some of these characteristics include the hygroscopic nature of powdered milk, settling and separation issues, hardening qualities of NDM when used in commercial feeds and supplements, as well as storage and handling concerns. Successful feeding methods include limiting daily intake of NDM and improving the handling qualities by diluting it with feed grains and byproduct feeds, decreasing the dustiness and improving handling by adding vegetable oils, and minimizing the product handling challenges by adjusting the sequence of ingredients added to the feed mixer or wagon.

Key Words: Non-fat Dried Milk, Supplement, Protein

Introduction

The USDA Livestock Feed Assistance Non-Fat Dry Milk (NDM) program was approved in 2003 for parts of several western states, including 17 counties in Wyoming. This program provided Non-Fat Dry Milk (NDM) for producers in designated counties at the rate of 0.91 kg/d NDM per head for cattle, and 0.23 kg/d for sheep and goats for a 30-d period. The non-fat dried milk product was valued at $80/ton. Participating operations were given the option of either having their allotment of NDM delivered to the feed company of their choice, and the estimated value of the NDM ($80/ton) applied towards the purchase of manufactured feed containing the NDM, or taking actual delivery of the NDM for their ranch. Additional items included in the livestock feed assistance program included: A) The NDM was made available to each state at a rate of $1.00 per truck lot with transportation costs paid by the Commodity Credit Corporation (CCC) to distribution points selected by the state. Actual amounts delivered were determined by using the U.S. National Drought Monitor. Counties that were listed as part of the drought area over a six month period were eligible for the program. Each month the CCC, using the U.S. Drought Monitor, re-evaluated whether a county meets the drought criteria. B) The quantity of NDM to be made available by CCC was based on ag census data estimating the total number of livestock (cattle, bison, sheep and goats) in each county, and providing the 30 d supply of NDM based on the previously mentioned feeding levels. Actual title to the NDM and risk of loss was transferred to the State upon delivery by CCC. C) The NDM sold by CCC could only be used for feeding foundation livestock herds, and the producer may sell or exchange the NDM to acquire feed containing NDM for their foundation livestock herd. All uses are permitted subject to the following limits: (1) the NDM may not be used as a replacement for whey or whey products; (2) the NDM may not be processed for or used for human consumption; (3) ultimate consumption of the NDM must be in the state(s) allocated the NDM.

While many producers chose to receive feed credits for their NDM allotment, additional operations chose direct delivery of their non-fat dried milk . The idea of receiving the free NDM product seemed quite attractive, but NDM also poses several handling challenges to producers, which are addressed below. Following the completion of the livestock feed assistance program, several private feed companies have continued to market NDM as an alternative protein source, pricing it competitively with other protein feeds.

Nutritional characteristics

As several popular press articles and publications have emphasized, NDM is an excellent feed resource (Table 1) with high levels of degradable protein. Protein associated with NDM has been reported to be 80% casein and 20% whey (Stock et al., 1986a; Taniguchi et al., 1995; Köster et al., 1996), and would work very well in a grazing situation, supplying high quality protein to grazing livestock (Hendrix et al., 1973; Procop et al., 1976; Stock et al., 1986b). One of the major concerns are that NDM also contains readily available sugars and proteins that can cause

digestive upset if large amounts are consumed. In addition, readily available sugars have a negative effect on low quality forage digestion, counter-acting any positive effects of the protein. Most recommendations are to limit daily intake of NDM to around 0.91 kg/d when feeding NDM as a protein supplement to grazing cattle, and to reduce feeding and handling concerns by diluting it with other feeds, such as cereal grains, byproduct feeds including soybean hulls, wheat middlings, and corn gluten feed.

Table 1. Nutrient Analysis of Non-Fat Powdered Milk, as-fed basis.

Item	USDA specs	Erickson et al. (2003)
Dry Matter, %	96.8	
Energy		
TDN, %	74	90
NEm, Mcals/lb	.80	
NEg, Mcals/lb	.52	
Protein, %	36.16	34 – 37
Fat, %	0.77	.6 – 1.25
Minerals		
Calcium, %	1.257	1.35
Phosphorous, %	0.968	1.1
Iron, g/lb	0.00145	
Magnesium, g/lb	0.50	
Potassium, g/lb	8.14	1.7%
Zinc, g/lb	0.0185	
Copper, g/lb	0.000186	

Handling Concerns with Non-Fat Dried Milk

Hygroscopic nature of powdered milk. Non-fat dried milk is extremely dry and powdery, with bagged feed averaging 98% DM. One of NDM's unique characteristics is it's ability to attract moisture. This can lead to several concerns in handling feed. Once moisture comes in contact with the NDM, it has a tendency to "set up". If it is not mixed or blended with other feeds, it has the potential to clog feed augers, cake feeders, etc. It may also be a problem if producers choose to hand-mix powdered milk into mineral supplements. If large amounts are hand-mixed into mineral supplements, it may lead to over-consumption of the mineral. If moisture comes in contact with the mineral, it will tend to harden, and large amounts of moisture may create conditions where the NDM-based feed will sour.

Because the NDM is hygroscopic, and attracts moisture, it is sometimes difficult to mix the dry form into mixed rations and supplements. If there are any wet ingredients, the NDM "clings" to the wet, resulting in uneven distribution and clumps. Producer comments and field observations both indicate mixing difficulties, especially when trying to combine NDM in prepared feeds and sacked TMR diets containing molasses.

Settling and separation concerns. Because the powdered milk is extremely fine, it has a tendency to settle out when it is mixed with grain and other coarse feeds. This could create problems if the NDM is included in grain mixtures for self-feeders or calf creep feeders. The NDM will tend to settle to the bottom, causing feeding problems, especially if it comes in contact with moisture.

Hardening qualities of NDM. Many producers and feed mill managers in the Western U.S. received a crash course in incorporating NDM in supplements this fall and winter. One of the lessens learned was that high levels of NDM in range cubes and cakes increased the hardness of the product. Most feed mills producing range cubes restrict the level of NDM to a maximum of 10 to 15% to avoid extremely hard range cubes.

Palatability concerns when NDM is fed at higher levels. In nearly all cases, dried non-fat milk works well in total rations that contain a smaller percentage of NDM. However, field observations suggest that rations and supplements containing high levels of NDM may lead to reductions in feed intake. Situations where this may occur include limit-fed rations, or top-dress supplements containing high levels of NDM. This may be an important factor to consider when intake is important, such as high-protein receiving supplements for weaned calves.

Uses for supplemental NDM. Determining how to effectively utilize NDM in summer grazing situations is challenging. While high protein supplements are very effective at improving digestion of low quality forages, improving intake and overall energy status, it may be difficult to provide additional NDM to cattle on remote summer grazing allotments. Because of this challenge, many producers chose delayed delivery of their drought assistance program NDM for late summer, fall and winter supplementation programs.

Storage Concerns. If producers choose to store NDM through the fall and winter, actual storage of the NDM may be difficult. It's hydroscopic nature, as well as insect and rodent concerns, create a challenge when trying to store the product for long periods of time. Keeping the product dry and well protected is essential for longer-term storage.

Recommended Winter Rations with NDM

Several states have published winter feeding recommendations for feeding NDM, depending on available feed resources. University of Nebraska recommendations (Erickson et al., 2003; based on 1100 lb cow) are as follows:

Gestation (amounts on an as-fed basis):

1. 47 lb corn silage, 2 lb NDM
2. 25 lb grass hay (53% TDN, 6% CP), 2 lb NDM
3. 22 lb crop residue (45% TDN, 4% CP)
   2 lb NDM, 0.8 lb DDG, 1.7 lb grain.
4. 9 lb crop residue, 2 lb NDM, 9.15 lb grain.

Early Lactation (as-fed basis):

1. 60 lb corn silage, 2 lb NDM, 0.55 lb DDG
2. 25.5 lb grass hay (53% TDN, 6% CP), 2 lb NDM, 2.8 lb DDG
3. 21 lb crop residue (45% TDN, 4% CP) 2 lb NDM, 5.5 lb DDG, 2 lb grain.
4. 9 lb crop residue, 2 lb NDM, 6.7 lb DDG, 6.7 lb grain.

Late Lactation (as-fed basis):

1. 55 lb corn silage, 2 lb NDM
2. 28 lb grass hay (53% TDN, 6% CP), 2 lb NDM, 1.6 lb DDG
3. 23 lb crop residue (45% TDN, 4% CP) 2 lb NDM, 4.5 lb DDG
4. 9 lb crop residue, 2 lb NDM, 3.3 lb DDG, 8.3 lb grain.

Feeding Recommendations

Common suggestions with handling and feeding NDM include: 1) Limiting non-fat dried milk levels to less than .91 kg/d when feeding as a supplement. However, several backgrounding and finishing operations have had success feeding higher levels to confined animals receiving total mixed rations. 2) Use vegetable oils and fats to condition NDM rations, helping to reduce dust and eliminate problems with "setting up". Experience at the University of Wyoming would suggest that 2.5 to 5% oil works extremely well. Water and/or molasses would also work to condition the supplement or feed, but require much higher levels. 3) When including NDM in total mixed rations, the order of feed ingredients during mixing is critical. Wet ingredients must be thoroughly mixed before adding NDM to prevent clumping and poor distribution. Several large feeding operations have avoided the mixing challenges of NDM by adding the non-fat dried milk directly to their silage during the packing process. 4. Feeding NDM in the dry form, by top-dressing on long stemmed hay, has proved to have little success. Non-fat dried milk is extremely fine, and is prone to wind loss or settling. Animals that inhale the fine powder may increase their risk to additional respiratory problems.

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